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Claims

1. A process for reducing the amount of sulfur-containing impurities in carbonaceous materials, comprising

(a) contacting said materials with an aqueous solution of hydrofluorosilicic acid in the absence of hydrogen fluoride under conditions wherein at least some of said sulfur-containing impurities react with said hydrofluorosilicic acid to form reaction products, and

(b) separating said reaction products from said carbonaceous materials.

2. A process for reducing the amount of sulfur-containing impurities in carbonaceous materials, comprising

(a) contacting said materials with an aqueous solution of hydrofluorosilicic acid in the absence of hydrogen fluoride under conditions wherein at least some of said sulfur-containing impurities react with said hydrofluorosilicic acid to form reaction products;

(b) separating said reaction products and said hydrofluorosilicic acid from said carbonaceous materials and subsequently

(c) treating said carbonaceous materials with a fluorine acid solution which comprises an aqueous solution of hydrofluorosilicic acid and hydrogen fluoride.

3. A process for reducing the amount of sulfur-containing impurities in carbonaceous materials, comprising:

treating said carbonaceous materials with a fluorine acid solution which comprises an aqueous solution of hydrofluorosilicic acid and hydrogen fluoride,

separating said carbonaceous materials from said aqueous solution of hydrofluorosilicic acid and hydrogen fluoride, and then

contacting said carbonaceous materials with an organic solvent capable of dissolving elemental sulfur.

4. The process of claim 1 or 2 wherein the concentration of hydrofluorosilicic acid in the step (a) is in the range of 27% to 37% (w/v or w/w or v/w).

5. The process of claim 1 or 2 wherein the concentration of hydrofluorosilicic acid in the step (a) is in the range of 28% to 36% (w/v or w/w or v/w).

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6. The process of claim 1 or 2 wherein the temperature of step (a) is in the range of 28 to 75°C.
7. The process of claim 1 or 2 wherein the temperature of step (a) is in the range of 30 to 70 °C.
- 5 8. The process of claim 1 or 2 wherein the reaction time of step (a) is in the range of 8 to 120 minutes.
9. The process of claim 1 or 2 wherein the reaction time of step (a) is in the range of 10 to 100 minutes.
- 10 10. The process of claim 1 or 2 wherein in step (a) the carbonaceous materials are mixed with at least about twice their weight of the aqueous hydrofluorosilicic acid.
11. The process of claim 1 or 2 wherein after step (b) treating said separated carbonaceous materials with further aqueous hydrofluorosilicic acid to remove residual metal fluorosilicates.
12. The process of claim 2 or 3 wherein the fluorine acid solution has a composition lying between the following compositions: 4% w/w H_2SiF_6 , 92% w/w H_2O , 4% w/w HF and 35% w/w H_2SiF_6 , 30% w/w H_2O , 35% HF.
- 15 13. The process of claim 2 or 3 wherein the fluorine acid solution has a composition lying between the following compositions: 5% w/w H_2SiF_6 , 90% w/w H_2O , 5% w/w HF and 34% w/w H_2SiF_6 , 32% w/w H_2O , 34% HF.
- 20 14. The process of claim 2 or 3 wherein the fluorine acid solution has a composition of about 25% w/w H_2SiF_6 , 50% w/w H_2O , 25% w/w HF.
15. The process of claim 2 wherein in step (c) the carbonaceous materials are treated with at least about twice their weight of the fluorine acid solution.
16. The process of claim 3 wherein in step (a) the carbonaceous materials are treated with at least about twice their weight of the fluorine acid solution.
- 25 17. The process of claim 1 wherein after step (b) comprising washing said separated carbonaceous material with aqueous H_2SiF_6 , and heating said washed carbonaceous material at a temperature in the range of about 250°C to about 400°C to evaporate any residual hydrofluorosilicic acid remaining on the carbonaceous material.

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18. The process of claim 3 wherein the organic solvent capable of dissolving elemental sulfur is ethanol, benzene, carbon disulfide, either or carbon tetrachloride, or a mixture of two or more of these.
19. The process of claim 3 wherein the step of contacting the carbonaceous materials
s with the organic solvent is at ambient temperature and atmospheric pressure.